NSW Stock Status Summary – 2024/25

Longfin Eel (*Anguilla reinhardtii*)

Assessment Authors and Year

This stock status summary condenses findings for Longfin Eel that were detailed in the following full stock assessment report:

Hall, K.C. and Schilling, H. 2025. Stock assessment report 2024/25 – River Eels – Longfin Eel (*Anguilla reinhardtii*) and Southern Shortfin Eel (*Anguilla australis*). NSW Department of Primary Industries and Regional Development – Fisheries, Coffs Harbour, 82 pp.

Stock Status

Current stock status	On the basis of the evidence contained within this assessment, Longfin Eel is currently assessed as sustainable for the NSW part of the stock.

Stock structure & distribution

The Longfin Eel (*Anguilla reinhardtii*, CAAB 37 056002) has a wide species distribution that extends along the entire eastern Australian coast from Cape York to Tasmania, and is also found at Lord Howe Island and Norfolk Island (Beumer and Sloane, 1990) and northern New Zealand (Jellyman *et al.*, 1996). The stock structure was investigated via a microsatellite genetic study, and results indicated that Longfin Eel forms a single panmictic biological stock along the Australian east coast (Shen and Tzeng, 2007). No other investigations of finer scale stock structuring among rivers have been undertaken, but panmixia with random larval recruitment has been determined for most other widely distributed Anguillid eel species (e.g., Pujolar *et al.*, 2014). There is currently no cross-jurisdictional stock assessment undertaken for the shared stock, so the assessment of stock status is presented at the jurisdictional level.

The data presented in this summary relate to the New South Wales (NSW) part of the stock.

Scope of this assessment

This report provides a determination of stock status for Longfin Eel according to the Status of Australian Fish Stocks (SAFS) framework (Roelofs *et al.*, 2024), using data up to and including 2023/24. Where necessary data for Longfin Eel were adjusted or combined with data for Southern Shortfin Eel (*Anguilla australis*), to support determination of a combined total allowable catch (TAC) for 'River Eels' in New South Wales (NSW) for the 2025-26 fishing season (1 May to 30 April). An interim total commercial access level (ITCAL, or transitional TAC) of 137 t for River Eels was first introduced in December 2017 and was set at the maximum annual combined catch weight reported

during the 10-year period 2002/03 to 2011/12 (NSW DPI, 2014). This transitioned to an adjustable TAC and was initially set at 100 t for the 2024-25 fishing season.

Biology

The Longfin Eel is a slow growing, large-bodied species with a life span of 10–52 years for females and 7–22 years for males (Walsh *et al.*, 2004, 2006). Given that the species is semelparous (i.e., breeds once at the end of their lifecycle), these ranges also reflect a wide variation in age at maturity. The species is also sexually dimorphic, with a larger size at sexual maturity for females (74–142 cm total length, TL) than males (44–62 cm TL) (Walsh *et al.*, 2003). In Australia, the species mainly inhabits the lower reaches and tidal areas of rivers east of the Great Dividing Range until reaching sexual maturity, preferring the fast running habitats over still waters. Mature adults migrate into the deep tropical ocean waters east of the Coral Sea to spawn (Jellyman, 1987; Pusey *et al.*, 2004). This semelparous life history strategy can make eels particularly vulnerable to recruitment overfishing (Hoyle and Jellyman, 2002). Furthermore, recruitment of juvenile Longfin Eel into NSW estuaries can be highly variable in response to environmental conditions (Silberschneider, 2005). A minimum size limit of 30 cm TL was introduced for Longfin Eel in 1997 and later increased to 58 cm TL in 2007.

Fishery statistics

Catch information

Commercial

Commercial catches of river eels landed from NSW waters rapidly increased in the early 1990s to supply a newly established live export market to China, with combined catches peaking at 469 tonnes (t) in 1992/93 (Fig. 1). Species identification and reporting prior to 1997/98 was questionable and over half of the catches were reported as ‘Eel, unspecified’; therefore, all historical data have been aggregated as mixed eels. Since 1997/98, species identification and reporting are considered more reliable, and catches have been dominated by Longfin Eel (Fig. 1).

Reported commercial catches of Longfin Eel reached a recent peak of 204.6 t in 2000/01 and averaged 85 t between 2002/03 and 2015/16 (Fig. 2). During 2016, the live export market for eels waned and processing facilities closed in NSW. As a result, the NSW Longfin Eel catches decreased from 82.6 t in 2014/15 to a minimum of 9.9 t in 2018/19 and was 14.6 t in 2023/24 (Fig. 2).

Most commercial catches of river eels in NSW waters are taken by eel trapping in the Estuary General Fishery (EGF), which targets the fully pigmented sub-adults or yellow eels after they have recruited back into estuaries and before they migrate upstream into freshwater reaches (Fig. 2). No eel trapping in freshwater rivers above tidal waters is permitted in NSW. However, since 1992, a limited number of Section 37 permits for commercial eel trapping in nominated dams and specific impoundments were issued to eligible commercial fishers who held EGF Eel trapping shares. The number of these permits has decreased each year from 39 farm dam and 6 impoundment permits in 1992 to just 5 eligible fishers in 2017 and only two with active permits. Similarly, there were some larger catches taken against these permits in the 1990s and 2000s, but since then catches have

been relatively small compared to those taken by eel trapping in the EGF (Fig. 2). No catches were reported against these permits in 2023/24.

Commercial catches in the EGF are reported across seven broad regions along the NSW coast. Catches of Longfin Eel have been reported from all seven regions, but were historcially largest in Region 2 on the north coast and Region 4 on the central coast (Fig. 3). Of the 150 or so estuaries in NSW, eel trapping in the EGF is currently permitted to operate in 76 estuaries; however, 80% of the Longfin Eel catch is typically taken from 9–11 main estuaries that have remained consistent through time (Fig. 4). However, since catches have declined from 2016, they have been taken from a smaller number of estuaries, with limited or no catches reported from Regions 1, 6 or 7 in recent years.

The Longfin Eel is also harvested by trap fisheries in Queensland, Victoria and Tasmania, but NSW catches have historically accounted for the largest percentage of total harvests of this species (Hall *et al.*, 2024). Queensland commercial catches fluctuated widely during the 1990s, peaked at 50 t in 2002, then averaged 19.8 t per annum between 2009 and 2016, and have recently declined to just 1.6 t in 2022 (QDAF, unpublished data). Tasmanian and Victorian freshwater eel catches are dominated by Southern Shortfin Eel, with recent catches of around 5 t per annum of Longfin Eel in each jurisdiction (Hall *et al.*, 2024).

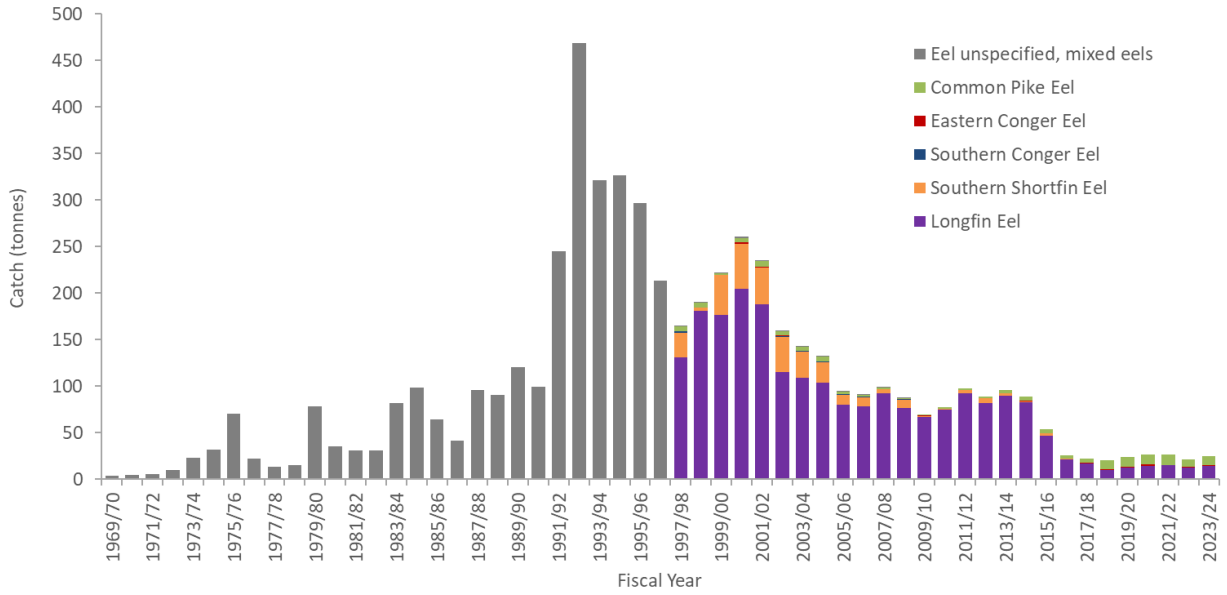

Figure 1 Annual commercial catches (tonnes) of river eels (all species) from estuarine and inland NSW waters (1969/70–2022/23). Prior to 1997/98 species reporting was considered unreliable and all catches have been combined as mixed eels.

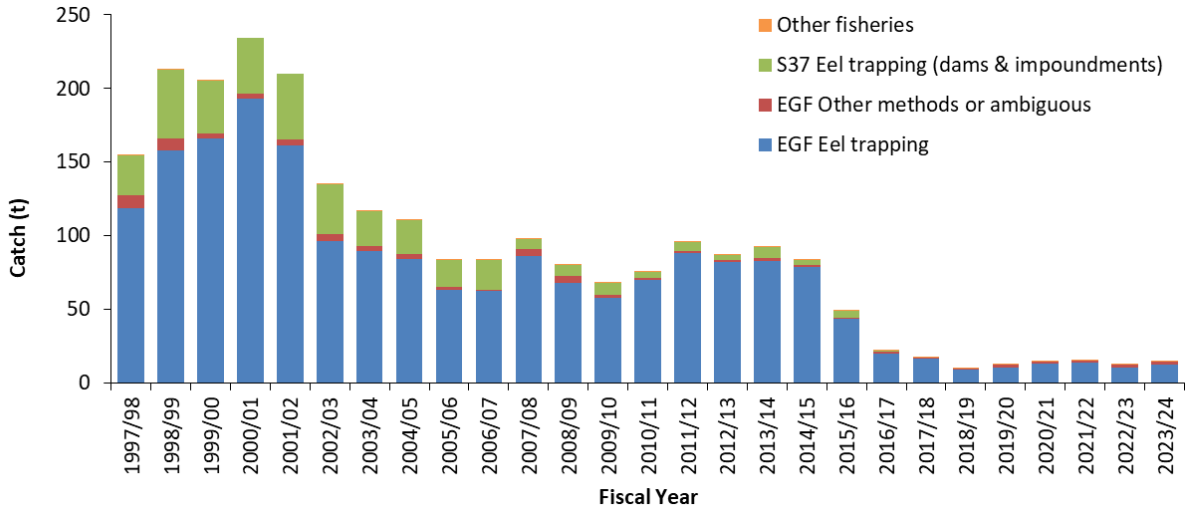

Figure 2 Annual commercial catches of Longfin Eel from NSW waters from 1997/98 to 2023/24 taken by different fisheries and methods. EGF = Estuary General Fishery, S37 = Section 37 permits.

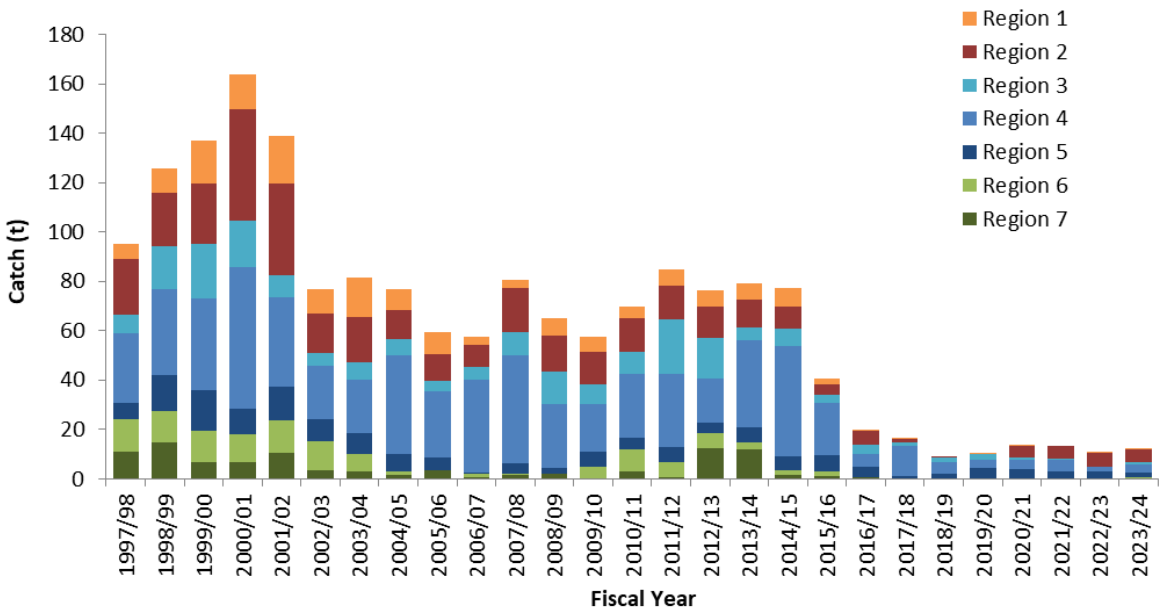

Figure 3 Annual commercial catches of Longfin Eel by the eel trapping sector in different regions of the NSW Estuary General Fishery from 1997/98 to 2023/24.

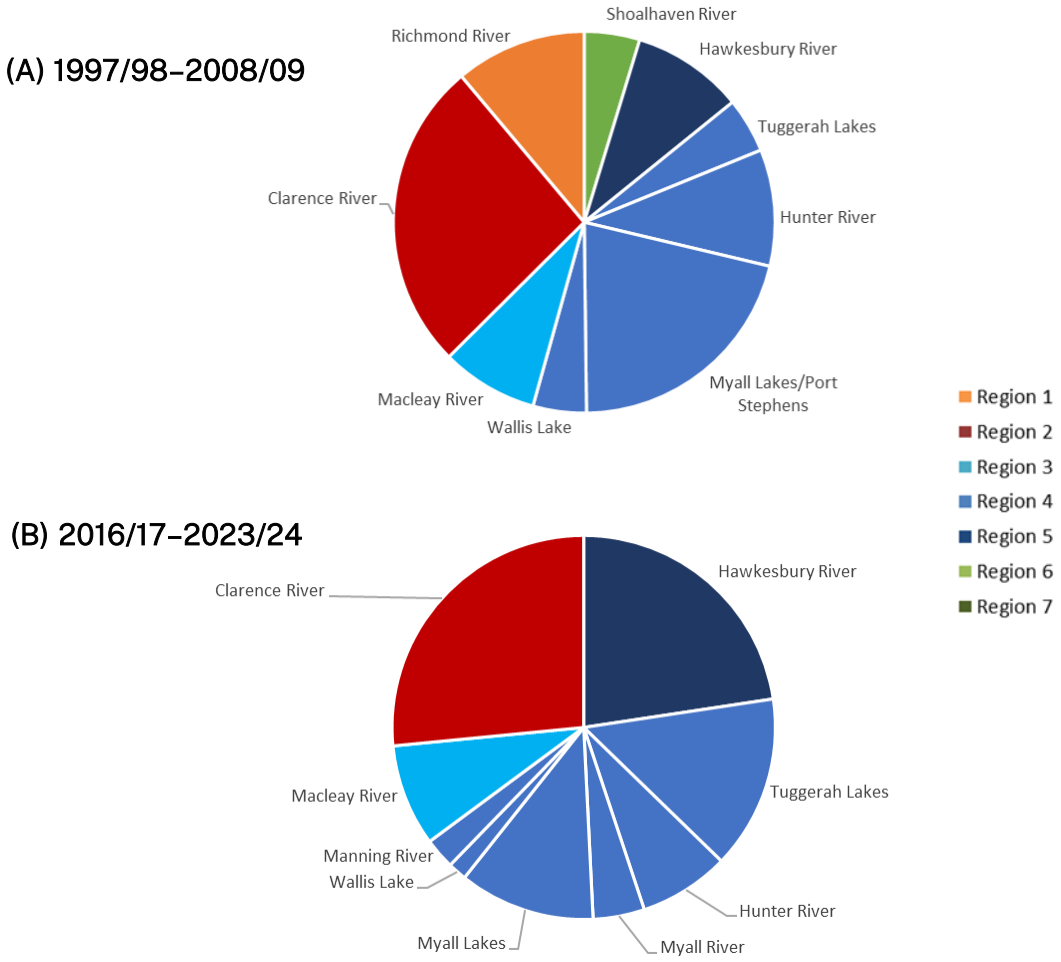

Figure 4 Longfin Eel catches landed from 9 main estuaries between 1997/98–2008/09 and between 2016/17–2023/24 (that accounted for 80% of total catches in each period) as reported by the eel trapping sector in the NSW Estuary General Fishery (colours indicate EGF regions).

Recreational & Charter boat

Recreational fishing for eels is covered in a biennial survey of recreational fishing in NSW, which collects data through telephone interviews of long-term (1- and 3-year duration) recreational fishing licence (ltRFL) holders and their household members over a 12-month survey period. Freshwater and saltwater eels are only reported as an undifferentiated group, so no species-specific information is available. In the most recent survey (2021/22, Murphy *et al.*, 2023), approximately 2% of households caught eels over the 12-month period, and only 0.2% of households retained any eel catch. This suggests that harvesting of eels is conducted by only a very small proportion of recreational fishers.

Expansion of survey data to the broader population of ltRFL households provided an estimated harvest of 2,993 eels in 2021/22, but given that only 2 households reported eel harvests this estimate had an equally high standard error (SE, 2,819 eels). A further 18,189 eels were estimated to be released following capture, and of the harvested eels, about 6% were reported to be taken from estuarine waters with the remainder harvested from freshwater rivers. Estimates of eel harvest from previous surveys were similarly low and with similarly high standard errors — i.e., 2,955 (± 2,636 SE)

in 2017/18 and 2,605 (± 1,198 SE) in 2019/20 (Murphy *et al.*, 2020, 2022). Historically, relative to commercial catches, recreational harvests have been comparatively small, comprising less than 1–2% of the total harvest of eels from NSW waters. Weight-converted estimates of recreational catch have been <2.5 t in recent years, however, as the commercial catch has declined this has represented as much as 14% of the total (commercial and recreational) catch.

Indigenous

A survey of Aboriginal cultural fishing in the Tweed River catchment identified river eels as one of the main components of freshwater catches (Schnierer and Egan, 2016). However, Longfin Eel only accounted for 0.8% of the total Aboriginal catch from the area (Schnierer, 2011). Total catches in the region were estimated to range between 117–350 Longfin Eel per annum (Schnierer, 2011) Statewide estimates of the annual Aboriginal harvest of Longfin Eel in NSW waters are unknown, but likely to be significant.

Illegal, Unregulated and Unreported

The level of illegal, unregulated and unreported fishing is unknown; however, eels were specifically mentioned in submissions to a comprehensive compliance review of potential black market issues in NSW waters (Palmer, 2004). Compliance reports and feedback from stakeholders suggests that considerable illegal fishing for adult eels historically occurred in prohibited freshwater reaches. If such landings were reported by licensed commercial fishers as catch from permitted waters, it could create uncertainty in the catch and catch rate series.

Since quota management was introduced for the two river eel species, reported catches of Common Pike Eel have increased in other EGF sectors, and it is unknown whether some proportion of these may be Longfin Eel. These catches are now of similar magnitude to the Longfin Eel catches and account for approximately half of the current total eel catch.

Fishing effort information

Commercial fishing effort for Longfin Eel was collected as number of days fished on monthly records prior to July 2009 and as numbers of traps fished per daily event after July 2009. To form a longer time series of effort, recent daily events were re-aggregated, with effort in days fished estimated from the number of fishing events entered for each fisher in each month where Longfin Eel was reported on at least one day.

Reported commercial fishing effort for Longfin Eel in the eel trapping sector of the EFG increased from below 5,000 days fished in 1997/98 to a peak of 6,721 days fished in 2001/02, before declining to 1,008 days fished in 2010/11 (Fig. 5). Fishing effort then increased steadily to around 1,880 days fished in 2014/15, but has been a small fraction (less than 3%) of past levels over the last seven years with 259 days fished in 2023/24.

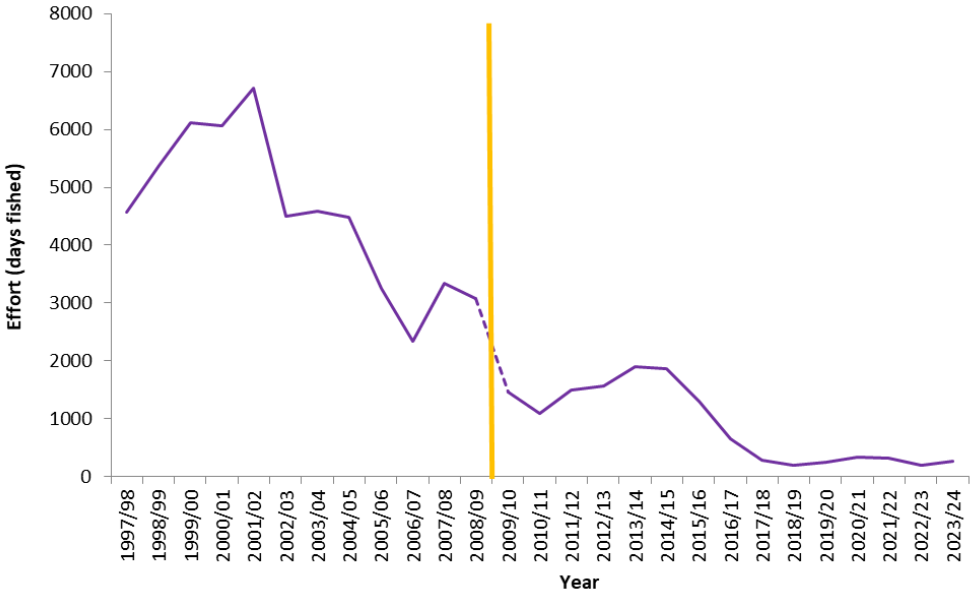

Figure 5 Annual effort (in days fished) for eel trapping in the NSW Estuary General Fishery for records where Longfin Eel was reported as landed on at least one day in each month (1997/98 to 2023/24). The vertical gold line indicates the change from monthly to daily catch reporting.

Catch rate information

Historical catch rates (catch-per-unit-effort, CPUE in kg per day) for Longfin Eel taken by eel trapping in the EGF were compiled from monthly records between 1997/98 and 2008/09. Recent catch rates (CPUE in kg per fishing event) were also compiled from daily fishing event records from 2009/10 to 2023/24.

The historical mean standardised catch rates derived from monthly records of Longfin Eel (raw data) declined substantially in the early 2000s and then increased back towards the long-term average (of 23 kg per day) during the late 2000s (Fig. 6, left graph). Recent mean standardised catch rates from daily event records (since 2009/10) suggest further declines occurred during the early 2010s, but over the last eight years catch rates have increased and were above the recent long-term average (of 45 kg per fishing event) over the last five years (Fig. 6, right graph). Analyses of regional variation in catch rates suggest this may be largely driven by recent increases in CPUE in Region 5.

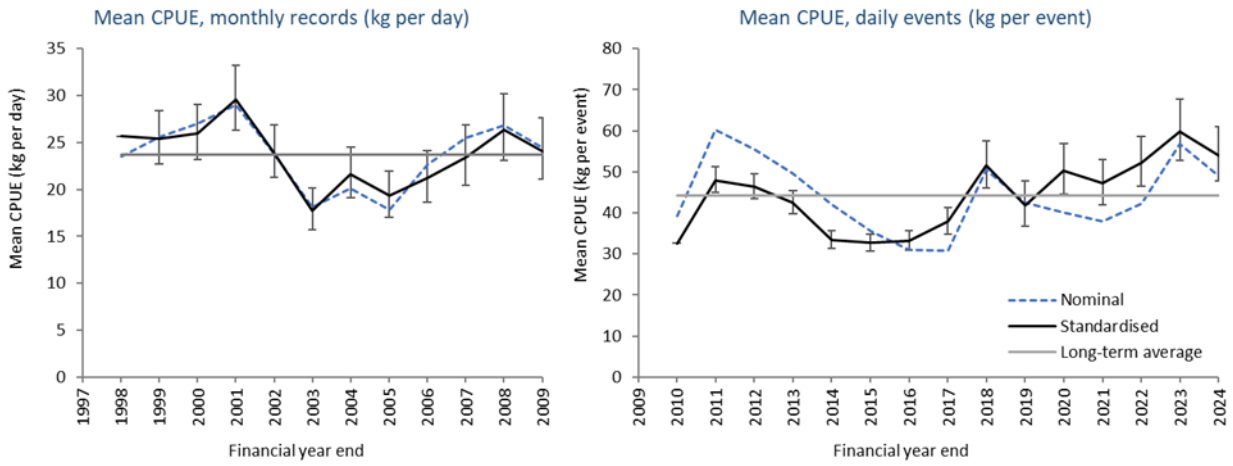

Figure 6. Mean standardised catch rates (catch-per-unit-effort, CPUE) of Longfin Eel taken by eel trapping in the NSW Estuary General Fishery, estimated from monthly records (1997/98–2009/10) in kg per day (left) and from daily events (2009/10–2023/24) in kg per event (right). The dashed and solid lines indicate the nominal and standardised mean CPUE (± 95% confidence intervals), respectively; and the grey horizontal line indicates the long-term average for each series.

Stock Assessment

Stock Assessment Methodology

Year of most recent assessment:

Hall and Schilling (2025)

No quantitative joint stock assessment of the entire biological stock is undertaken.

Assessment method:

A weight-of-evidence approach was used to assess the stock status of Southern Shortfin Eel in NSW waters. It incorporated results from the following four data sources:

1. Standardised catch-rate analyses (catch-per-unit-effort, CPUE) of historical monthly records (in kg per days fished, kg per day) between 1997/98 and 2008/09 for the main commercial fishing method, eel trapping in the Estuary General Fishery.
2. Fishery-independent river surveys completed by electrofishing between 1994 and 2024 for catchments east of the Great Dividing Range. These cover of range of different studies that have varied in sampling intensity and distribution, and do not represent a stratified or regular sampling design.
3. Size distribution data from the above two data sources.
4. Fishing effort for eel trapping in the Estuary General Fishery as proxy for relative fishing pressure.

Main data inputs:

The main data inputs for the stock assessment included:

- Commercial catch and effort data for all NSW commercial fisheries by fiscal years (1997/98–2023/24).
- Historical commercial catch rates (catch-per-unit-effort, CPUE in kg per day) standardised from commercial logbook data reported by fishers of the EGF eel trapping sector by fiscal years (1997/98–2008/09).
- Commercial catch rates recent (CPUE in kg per event) standardised from commercial logbook data reported by fishers of the EGF eel trapping sector by fiscal years (2009/10–2023/24).
- Fishery-independent freshwater river survey catch and effort data for boat and backpack electrofishing (in numbers of eels per 90 second shot) compiled from a range of projects and survey designs by fiscal years (1992/93–2023/24).
- Size distribution data compiled from: (1) fishery-dependent and research surveys using commercial eel traps in the tidal reaches of the Clarence River, Hawkesbury River and Port Hacking in 1998 to 2000 (Walsh *et al*., 2004); and (2) electrofishing surveys in freshwater river reaches during the various fishery-independent river surveys (as above).

Key model structure & assumptions:

- Standardised catch rates

Mean annual commercial fishery catch rates were standardised using general linear models (GLM) fitted to monthly and daily event records for each fisher using a range of correlated factors via the R package 'rforcpue' v. 0.0.0.3 (Haddon, 2023). The CPUE standardisations and analyses assumed that the annual catch rates are a relative index of abundance and are not unduly influenced by other factors that are not accounted for through standardisation. Catch rates were standardised for the influences of different months, estuaries, regions (for statewide aggregated data), fishing businesses and trap numbers lifted (recent data only).

- Fishery-independent river survey data

Electrofishing catch rates from the freshwater river surveys were standardised using general linear mixed models (GLMM) models with a Tweedie distribution to generate an annual index of relative biomass. The GLMM models were run using data for all NSW coastal rivers pooled to generate a statewide index and separately for three bioregions (northern, central and southern). The models included financial year and method as fixed effects, site and sampling date as random effects and accounted for varying sampling effort with an offset effort term. The regional models also included a region by year interaction.

The relative biomass estimates calculated from the freshwater river survey data are not absolute, but rather relative indices, because only data for sites where at least one eel was observed were included in the analyses. The analyses involved several other assumptions, including:

- that eels measured during each sampling event were representative of others that were observed, but not measured; and

- that eels counted during a sampling event, where none were measured from that event, had a mean length similar to all eels measured in that financial year.

Biomass estimates were generated for each sampling event by calculating the mean length of eels in a sampling event, then applying a length-weight relationship and multiplying by the total number of eels.

Sources of uncertainty evaluated:

In addition to the standardised CPUE series produced from the as reported raw data, similar standardised CPUE series were prepared using data adjusted for potential inaccurate species reporting in northern NSW (Hall and Schilling, 2025). Furthermore, a sensitivity analysis of the influence of different CPUE standardisation modelling approaches (general linear models, GLM and general linear mixed models, GLMM) and methods to reweight predicted Year:Region coefficients from pooled statewide models were assessed for Longfin Eel (adjusted data) taken by eel trapping in the EGF between 2009/10 and 2023/24 (Hall and Schilling, 2025).

Status Indicators - Limit & Target Reference Levels

There is no harvest strategy in place for Longfin Eel in NSW, so a weight-of-evidence approach has been applied in this stock assessment with nominated indicators and reference points in line with the current NSW Harvest Strategy Policy (NSW DPI, 2021).

Biomass indicator or proxy	Trend in annual standardised catch rates of the eel trapping sector of the commercial EGF is used as an index of relative abundance.
Biomass Limit Reference Point	Current catch rates are compared to the long-term averages of each time series.
Biomass Target Reference Point	None specified.
Fishing mortality indicator or proxy	Trend in the total fishing effort of the eel trapping sector of the EGF is used as an indicator of relative fishing pressure.
Fishing mortality Limit Reference Point	Current effort levels are compared against historic levels.
Fishing Mortality Target Reference Point	None specified.

Stock Assessment Results

Stock Assessment Result Summary

Biomass status in relation to Limit	Trends in standardised historical catch rates of the commercial eel trapping sector of the NSW Estuary General Fishery (EGF) suggest that some reduction in biomass may have occurred between 1990 and 2009. More recent standardised catch rates, since 2010, show further declines until 2015, but have fluctuated around an increasing trend since then to be above the long-term average over the last five years. New relative biomass indices estimated from fishery-independent surveys in freshwater river reaches show similar stable trends over a long time series. Although for both data sources, trends over the last eight years have been based on relatively few records. Harvest levels over the last eight years have been well below the TAC. The weight of evidence suggests that recent low harvest rates have permitted some biomass recovery following some earlier declines in catch rates and that the current stock biomass in NSW waters is unlikely to be recruitment overfished.
Biomass status in relation to Target	Not assessed.
Fishing mortality in relation to Limit	Fishing effort over the last eight years has been very low (2.3%) relative to past levels, and is unlikely to cause the stock to become recruitment impaired.
Fishing mortality in relation to Target	Not assessed.
Current stock status	On the basis of the evidence above, the NSW part of the Longfin Eel stock is currently assessed as a sustainable stock.

Fishery interactions

The EGF eel trapping gears interact with other commercial and non-commercial by-catch species, a range of endangered, threatened and/or protected (ETP) species and freshwater habitats. However, the current regulations for eel trapping in the EGF, which include restricting eel fishing to tidal estuarine waters and some farm dams and artificial impoundments and using wingless baited traps are likely to limit the amount of interactions with protected species such as platypus.

The use of traps with no wings reduces drowning of platypuses, and prevents mortality of small forage fish species, which might be captured by "gilling" in the wings of fyke nets (Grant, 1993).

Furthermore, The EGF share management plan mandates that all eel traps must have a 100 mm rigid ring fit to funnel entrances to prevent air breathing animals (such as freshwater turtles and platypus) from entering the traps. Traps in freshwater dams and impoundments must also include an air pocket in the cod end. Mesh size and other gear restrictions are regulated to increase the target species selectivity of the traps and cod ends. Research results suggest that these measures significantly decrease the levels of by-catch associated with these fishing gears (Grant *et al.*, 2004).

Interactions with animals protected under the *Environment Protection and Biodiversity Conservation Act* 1999 were subjected to a detailed risk assessment in an environmental impact statement (EIS) for the fishery undertaken during fisheries management strategy development (NSW Fisheries, 2001). An updated threat and risk assessment for all components of the NSW marine estate was completed in 2017 (Fletcher and Fisk, 2017). The EGF was considered a moderate threat to species and communities protected under the *NSW Fisheries Management Act* 1994 and *Biodiversity Conservation Act* 2016. Compulsory logbook reporting of all interactions with ETP species was mandated in 2005 and these are reported annually to the Department of Environment and Energy.

Stakeholder engagement

Results of this and the previous stock assessment were presented to industry members via video conference on 5 March 2024 and 5 March 2025. Feedback from industry members suggested that: current catches are limited by the lack of an export market, with fewer fishers actively targeting river eels at present; the lack of catches from Regions 1, 6 and 7 are due to some fishers not receiving share allocations in regions they previously fished and other fishers concentrating on areas closer to home while market demand has been low; species identification and reporting, particularly for historical data, is likely to have been inaccurate and may have contributed to an increased amount of Southern Shortfin Eel data than was actually caught; and there was potentially significant illegal fishing in freshwater reaches that was reported as tidal catches. This feedback should be considered when interpreting current stock assessment results.

Qualifying Comments

The following are important considerations for determining a basket TACC for River Eels in NSW waters:

- Current levels of fishing effort on river eels are extremely low and are likely to be permitting recovery of biomass, which is reflected in the increasing trends in both standardized commercial catch rates from tidal waters in estuaries and new relative biomass indices estimated from fishery-independent electrofishing surveys in freshwater river reaches.
- The influence of catch reporting changes on commercial catch rates, especially during the transition from monthly to daily reporting in July 2009, should be considered when interpreting long-term trends.
- The eel trapping sector of the commercial EGF is only permitted to operate in the tidal waters of a limited number (76) of estuaries along the NSW coast and excluded from all freshwater and inland river reaches. Limited eel trapping is also permitted in a small number of nominated farm

dams and coastal impoundments through sections 37 permits, but few of these are still active. This provides protection for a potentially large percentage of NSW eel stock in closed estuaries, freshwater river reaches and impoundments.

- Compliance activity suggests that some illegal fishing occurred in freshwater systems that were closed to fishing and has likely inflated catch rates in some systems and years. However, there are no quantitative estimates on IUU fishing with which to correct data.
- At the time the transitional TAC was introduced, regulations on the numbers of traps per fishing business were also changed. Historically, each fishing business was limited to 10 traps; whereas, following structural reforms in July 2018, as an incentive to invest in shares, fishing businesses were entitled to one extra trap for every 10 shares held above the 125 minimum shareholding. As a result, there is potentially greater latent fishing effort in the sector at present than during the period of peak landings and fishdown during the early 2000s.

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